



2006 Advi sors Handbook

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Introduction

Envirothon Philosophy

The goal of environmental education is the development of knowledgeable, skilled and dedicated citizens who are willing to work toward achieving and maintaining a natural balance between quality of life and the quality of the environment. ALCOA Foundation, The Louisiana Environmental Education Commission, the Governor's Office of Environmental Education and other partners are promoting environmental education through the Louisiana Envirothon. The Louisiana Envirothon works in partnership with resource management professionals and the general public to promote and strengthen the goal of environmental education.

What Is The Envirothon?

The Louisiana Envirothon is a multidisciplinary, environmental problem-solving competition for students in grades 9 through 12. Teams will be comprised of students from the same school or associated with an organized group (i.e. FFA, 4-H, home-school groups, etc.). Participating teams (five students) train and compete in five natural resource areas: soils, aquatic resources, forestry, wildlife, and a current environmental issue. There is also an oral presentation component of the competition, in which teams present a solution to an environmental problem related to the current issue. Throughout the competition students learn in a real-life context the complexities of solving environmental problems while working as a team and having fun.

The Louisiana Envirothon

The Louisiana Envirothon will be held at the Model Sustainable Agriculture Center (MSAC) of the University of Louisiana at Lafayette on June 3, 2006. The MSAC is located at the Cade Farm facility on 1234 W. J. Bernard Road in St. Martinville, Louisiana. The winning state team will travel to the Canon Envirothon competition this summer to represent Louisiana, provided they meet the scoring requirements. The Environmental Education Commission will pay the team's expenses to the Canon Envirothon Competition. Information on the Canon Envirothon Competition can be found at www.envirothon.org.

Advisors

Volunteer Advisors are responsible for directing local Envirothon groups/teams. His or her duties include promoting the Envirothon program, recruiting students to participate, and arranging/providing the learning activities, curricula, and anything else necessary to prepare his/her group for competition.

Many resources are available to assist an advisor with his/her responsibilities and can be obtained from the Louisiana Envirothon Committee.

Goals and Objectives

Goal 1:

To promote a desire to learn more about the natural environment and equip students with the knowledge and skills needed to apply the basic principles and practices of resource management and ecology to complex environmental issues.

- a.** Students should be able to demonstrate a basic knowledge of concepts in natural resource management and ecology, especially in the areas of soils/land use, aquatic ecology, forestry, wildlife, and current environmental issues.
- b.** Students should be able to analyze soil, aquatic, forestry, wildlife, and current environmental issues in problem-solving activities involving resource issues.

Goal 2:

To promote stewardship of natural resources and to encourage the development of the critical thinking, cooperative problem-solving, and decision-making skills required to achieve and maintain a natural balance between the quality of life and the quality of the environment.*

- a.** Students should be able to identify environmental issues in a given situation and the various interests involved, while taking into consideration ecological, social, and economic factors.
- b.** Students should be able to investigate issues using both primary and secondary sources of information and synthesize the data gathered. Additionally, students should demonstrate the ability to:
 - Listen with comprehension;
 - Collect, organize, and analyze information;
 - Frame appropriate questions to guide their investigation;
 - Use a range of resources and technologies in addressing questions; and
 - Critically examine information from a variety of sources.
- c.** Students should be able to assess the nature of information and materials from a variety of different viewpoints and evaluate their implications.
- d.** Students should be able to identify alternative solutions for various issues and their associated value perspectives. They should be able to evaluate alternative solutions with respect to their ecological and

cultural implications. Additionally, the alternative solutions generated should attempt to take into consideration the variety of interests involved, while maintaining a healthy environment.

e. Students should be able to identify and evaluate their own position on environmental issues and their associated solutions. These positions should be based on balanced information, critical analysis, and careful synthesis. Moreover, students should be able to test their position against new information, personal experiences and beliefs.

f. Students should be able to evaluate the interaction of the proposed solution with other ecological and social factors and anticipate having to plan ahead when evaluating the long and short-term implications of possible solutions to environmental problems.

Goal 3:

To provide students with experience in environmentally-oriented activities, enabling them to become environmentally-aware, action-oriented citizens.*

a. Students should have knowledge of a wide range of action strategies involved in seeking solutions to environmental problems.

b. Students should have a knowledge of agencies and organizations that can be used as resources to seek solutions to environmental problems.

c. Students should be able to evaluate the impact of their own actions affecting a particular environmental problem and devise alternative actions to work towards improving environmental conditions.

d. Students should be able to work independently and/or collaboratively to solve environmental problems.

*Adapted from the draft National Standards for Environmental Education (NAAEE), August 1995 draft.

The Competition

Overview

Students, competing as team members, rotate through a series of five stations that are managed by natural resource specialists. For example, a forester may conduct the forestry station, and a soil scientist can be expected to coordinate the activities at the soils station. At each of the five stations, team members will be given a written test (which involves hands-on field activities) to complete. Each test is taken as a team with each team member participating in answering the questions. Test questions may be asked in a variety of ways. For example, test questions may be, but are not limited to multiple choice, true/false, essay or fill-in-the-blank.

Each team will also be presented with an environmental problem that is based on the "current environmental issue." The hypothetical environmental problem situation (and presentation materials) will be given to each team before the competition. Each team will be asked to develop and present a management plan for the hypothetical problem. All team members must verbally participate in the oral presentation.

The top scoring team at the state competition may represent Louisiana at the Canon Envirothon.

Competition Scoring

1. There will be a first-place winner in each of the following areas of the competition: Aquatic Resources, Forestry, Soils, Wildlife, Current Issue and Oral Presentation.
2. The winner of each testing station — Aquatics, Forestry, Soils, Wildlife and Current Issue, will be the team with the highest test score (100 points possible). The Oral Presentation is judged by a panel of experts. The Oral Presentation score will be the average of all the judges' scores (200 points each).
3. There will be one overall winner. The overall winner is determined by the cumulative total (700 points possible) of the five station test scores (100 points each) plus the final oral presentation score (200 points). This team with the highest score and meeting the committee's

achievement requirements will represent Louisiana at the Canon Envirothon.

4. If needed, the tiebreaker shall be in the following order: Oral Presentation Score, Current Issue score, Aquatic resources score, Forestry score, Soils score, Wildlife score.

Rules and Regulations

The Louisiana Envirothon shall be conducted under the following rules and regulations:

1. Only students enrolled in grades 9 through 12 or equivalent home school ranking in the current school year are eligible to compete in the Louisiana Envirothon.
2. A school may send multiple teams to the Louisiana Envirothon. Each team will compete independently.
3. Each team must consist of five students from the same school and/or organization. All team members and advisors must attend all scheduled functions. Only the five team members will be allowed at the testing stations. Team members may be substituted by submitting written notification to the Office of Environmental Education prior to May 1.
4. Teams must be accompanied by an adult advisor. Advisors are required and will be responsible to assure that the team members display proper conduct.
5. There will be no access given to the testing stations for team advisors or students before the competition or during breaks.
6. No advisor, sponsor, teacher, alternate, or parent may communicate with team members once the competition begins. When messages between competing student teams and others are necessary they shall be delivered by members of the Envirothon Committee.
7. During testing, breaks, and lunch, the advisors may not rotate or join their respective teams. No contact between advisors and their team shall be made until after all testing and oral presentations are completed. Each team will be assigned an adult team buddy who will accompany them throughout the competition. Advisors will be

assigned to an advisors group if they wish to rotate among testing stations during the competition.

8. Teams from the same school are not permitted contact until after testing is completed.
9. Weapons, tobacco, illegal drugs, and alcohol are not permitted during any part of the competition. No backpacks will be allowed on the testing circuit.
10. Only content keys, reference materials, and equipment provided by the Louisiana Envirothon Committee will be allowed for use at the event. No electronic, battery-operated or solar-powered equipment including cell phones may be used by teams during any portion of the competition.
11. Judges' decisions are final on all events.
12. Noncompliance with any of the aforementioned rules will be grounds for disqualification.

The Rules and Regulations of the Louisiana Envirothon are subject to change. All changes to the Envirothon rules will go into effect on September 1 and will be in effect until August 31 of the following year.

Competition fees are non-refundable.

Oral Presentation Rules

1. Oral presentations must be 10-15 minutes in duration.-
2. Each team member must have an equal part in the oral presentation.
3. There will be a question period by judges.
4. Visual aids must be prepared on-site by team members using only materials provided by the Envirothon Committee. All presentation materials will be collected from the student teams after the oral presentation preparation time provided.

Current Environmental Issue

Water Stewardship in a Changing Climate

The theme of Water Stewardship in a Changing Climate causes us to focus on the role that water plays in our lives now and in the future, and includes such aspects as water quality, supply, use and allocation, conservation and management. Whether the particular issue at hand is one of domestic water supply, the protection of life and property, economic development, agriculture production and processing, or ecosystem health, the public is becoming more aware of the finite nature and importance of the water resource.

Water is a key consideration in each of the four Envirothon disciplines - forestry, soils, wildlife and aquatics. Water crosses international, state, provincial, municipal and private boundaries transporting benefits and impacts. Changes in climate have and will continue to influence the quantity and quality of water and the timing of water events in the ecosystem. Examining water stewardship within the framework of global climate change brings an exciting, mind-bending focus for high school students and adults alike.

Government agencies at all levels are becoming more involved in the complex activities associated with managing both the allocation and quality of water resources. On the continental scale, although many of the issues are similar, impacts and appropriate adaptive solutions will vary, due to regional differences in the extent and severity of climate change effects, water supply and demand issues, and local, state and provincial, and national management practices.

Changes and variations in climate, either as part of a natural cycle or anthropogenic in origin, will directly affect water resources. Even if rainfall increases in some areas, this may be more than offset by higher temperatures, which will result in higher losses due to increased transpiration and evaporation. The net effect may be one of lowered stream flows and water tables, and reduced water quality caused by increased concentrations of pollutants and eutrophication. An increase in the demand for irrigation water could also be expected to diminish water supply and water quality power generation, recreation and natural ecosystems in a large and heavily populated portion of North America.

Soil degradation continues to be a challenge in North America due to erosion, chemical depletion, water saturation and solute accumulation. Changes in climate could accelerate this process. Increased moisture stress and drought are concerns in both irrigation and non-irrigation farming operations since if adequate water is not available at appropriate times of the year– production declines can be expected and, in some cases, complete crop failure may result.

The actual impacts on agriculture at the local level will vary depending upon such factors as precipitation changes, soil conditions and adaptive capacity. With respect to forests and forestry, climate changes may have important and far-reaching implications. Forests are important regulators of the hydrological cycle and even in disturbed landscapes, tree and ground cover in riparian zones directly affect water quality and quantity. Changes in climate can cause fundamental changes in forest ecosystems dynamics, i.e. temperatures, CO₂ concentrations, forest productivity, natural disturbance rates, fire, insects and disease, ecosystem instability, changing landscapes, decreased timber supply.

State Competition Preparation Checklist

Maintain close contact with the Governor's Office of Environmental Education prior to the competition. Ensure the following checklist is completed:

- Your team is registered and the registration fee has been paid.
- Transportation has been arranged to the competition location.
- Team members are familiar with the rules of the competition.
- Team members are trained in each of the five test areas: soils, aquatic resources, forestry, wildlife and the current environmental issue.

Learning Objectives

Aquatic Resources

Students should be able to:

1. Describe the processes of the hydrologic cycle including transpiration and aquifer recharge.
2. Describe water in its three states of matter, the structure of the water molecule and relate it to water's ability to dissolve substances, cohesion and capillary action.
3. Discuss what causes nitrate contamination of well water; where in the U.S. you would most likely find it, what can happen if you drink nitrate contaminated water and what can be done to reduce it. Understand basic well construction and the importance of well grouting. Know what wellhead protection is and what constitutes a wellhead protection program.
4. Discuss what ground water and the processes that cause it to become stored and replenished mean. Understand recharge and how it occurs. Learn the processes of ground water contamination and what can be done to clean contaminated ground water. Discuss how an on-site waste disposal system works.
5. Explain how drinking water is monitored using the Safe Water Drinking Act. Be able to discuss the importance of the Clean Water Act.
6. Discuss coliform bacteria and explain why they are used as indicator organisms in drinking water.
7. Know what water conservation is and steps that can be taken at both the individual and government levels. Understand some of the basics of water resource management.
8. Discuss what causes lead contamination in drinking water and what can be done to decrease it.
9. Understand what is meant by non point source pollution and be able to give some examples, including plant nutrients, sediment and toxic chemicals.
10. Explain some basic water quality parameters such as pH and toxic chemicals. Be able to identify the equipment used by scientists who monitor water. Know how to use a pH meter, a thermometer and a dissolved oxygen meter.

11. Describe a wetland. Discuss why wetlands are important and what steps might be taken to preserve them. Know the difference between several types of wetlands such as marshes and estuaries.
12. Describe a simple aquatic food web, including producers and consumers, herbivores, omnivores, carnivores and detritivores.
13. Describe a watershed. How could you use a topographic map to outline a watershed?
14. Describe and identify simple aquatic insects, especially those which can be used to indicate clean or polluted water.
15. Explain the water treatment processes used to produce clean drinking water or to treat sewage.

Forestry

Students should be able to:

1. Identify common trees without a key.
2. Understand the uses of different trees for pulp, lumber, wildlife, etc.
3. Identify specific or unusual species of trees or shrubs through the use of a key.
4. Understand tree anatomy and physiology.
5. Understand how wildlife habitat relates to: forest communities, forest species, forest age structure, snags and den trees, availability of food and cover and riparian zones.
6. Understand basic forest management techniques and the purpose for their use- harvesting regulations, intermediate cutting and TSI (timber stand improvements) protection.
7. Be familiar with the use of a Biltmore Stick and other forestry tools.
8. Understand the value of trees in urban/suburban/rural settings and the factors affecting their health and survival.
9. Understand the multiple use concept in the management of forests.
10. Be familiar with forest history, forest inventory and what is meant by sustainable forestry.

Soils

Students should be able to:

1. Know the characteristics of soil horizons and the features of a soil profile.
2. Identify and understand soil properties (including color, texture, structure, porosity, etc.) and their relation to soil characteristics, uses and limitations.
3. Know the characteristics of soil constituents (clays, organic matter, sand and silt).
4. Understand soil drainage classes and know how wetlands are defined.
5. Know how to use and understand a soil survey.
6. Know how soil can be used as a filter for pollutants.
7. Be aware of the effects of land uses on soils.
8. Identify the factors affecting soil erosion by wind and water.
9. Understand the origin of soil parent materials and be familiar with glacial geology.
10. Understand the nature of plant nutrients and how they are held by soil material.
11. Understanding of soil water, its movement, storage and uptake by plants.
12. Know how to measure soil slope.

Wildlife

Students should be able to:

1. Identify common wildlife species (game animals, furbearers, endangered species, etc.) and be able to identify biofacts (hair, fur, feathers, gnaw marks, etc.) wildlife signs. Keys will be used for more extensive identification.
2. Identify basic wildlife habitat and survival needs (food, water, shelter/cover, space).
3. Describe specific adaptations of wildlife to their environment and their role in the ecosystem.
4. Describe predator - prey relationships and give examples.
5. Describe food chains and food webs and cite examples.

6. Evaluate a given habitat for its suitability for a designated species, given a description of the habitat needs of the species.
7. Describe ways that habitat can be improved for specific species by knowing their habitat requirements.
8. Describe factors that limit or enhance population growth. Discuss the concept of carrying capacity and limiting factors.
9. Discuss various ways the public and wildlife managers can help in the protection, conservation, management and enhancement of wildlife populations.
10. Describe the potential impact of the introduction of non-native species.
11. Describe major factors affecting threatened and endangered species and methods used to improve the populations of these species.
12. Identify species from given natural history information.
13. Understand the roles of wildlife in an ecosystem.
14. Understand some key wildlife laws and the reasons behind many DNR regulations. (i.e. regulations designed to protect the resource and spread it out among would-be users).
15. Understand some of the basic "tools" of wildlife managers (hunting, habitat manipulation, population census techniques, people management, etc.)

Current Environmental Issue

Water Stewardship in a Changing Climate: Water quality and availability are threatened by a changing climate, leading to concerns about human health, biodiversity, and economic development. The effects of climate change on our water resources need to be understood and actions implemented that minimize the risk, and maximize the benefits of change.

1. Understand how changes in climate will impact both the quantity and quality of water available to human and ecological systems.
2. Understand the science and modeling of climate change.
3. Discuss water stewardship actions that could be undertaken now in anticipation of climate change impacts on water resources.

4. Discuss mitigation opportunities for water stewardship in a changing climate.

Soils: Soil degradation continues to be a challenge for agriculture due to erosion, nutrient leaching, drought and water saturation. Changes in our water resources may exacerbate an already serious situation in some areas, leading to accelerated levels of soil degradation.

1. Discuss impacts on agriculture due to changing water regimes, including precipitation, ground water, erosion and pollution.
2. Explain the potential risks and benefits of climate change on agricultural production, both locally and globally.

Aquatics: Water resources are vital to aquatic ecosystems. Any change in the water resources will impact these systems.

1. Understand the implications of cross boundary (municipal, state, provincial and international) jurisdictional water issues.
2. Describe how changes in climate, whether part of a natural cycle or exacerbated by the greenhouse effect, will impact on water resources.
3. Discuss climate change impacts on aquatic ecosystems, plant and animal species, biodiversity and natural processes.

Forestry: Forests cover a significant portion of North America and play an important role in the global carbon cycle. The forest is an important component of the hydrological cycle and, even in disturbed landscapes, tree and ground cover in riparian zones regulate flow and maintain surface water quality.

1. Discuss impacts of changing water resources on forest ecosystems, plant species, forest pests, biodiversity, and natural processes such as forest migration and wildfire.
2. Explain potential risks and benefits of climate change on forestry production, both locally and globally.

Wildlife: Water resources have an influence on wildlife diversity, health, and behavior. Changes in the water resources due to climate change will impact wildlife.

1. Discuss impacts of climate change, as it relates to water resources, on wildlife species, habitat, biodiversity, and natural processes and behaviors such as migration, predation, and reproduction.
2. Explain potential risks and benefits of climate change on native species' range expansion/contraction, and the implications to natural systems of increased levels of invasive and exotic species.

Partners

The Louisiana Envirothon is made possible by the cooperative efforts of the following organizations:

Sponsored by

ALCOA Foundation

Governor's Office of Environmental Education

Louisiana Environmental Education Commission

In Cooperation with

Louisiana Cooperative Extension Service

Louisiana Department of Agriculture and Forestry

Louisiana Department of Environmental Quality

Louisiana Department of Wildlife and Fisheries

University of Louisiana at Lafayette

With Support from

Louisiana Environmental Education Commission

Louisiana Association of Conservation Districts

Louisiana Environmental Health Association

Resources

Sample Test Questions

Sample tests are available on the Canon Envirothon website at www.envirothon.org/sitemap.

Oral Presentation Judges' Scoring Sheets

The Louisiana Envirothon will use the Canon Envirothon Judges' Scoring sheets for its state Envirothon competition. The Canon Envirothon Judges' Scoring sheets are available at the Canon Envirothon website at www.envirothon.org/sitemap.

Resource Organizations

Publications and reference materials for all disciplines can be obtained from local, state, and federal agencies listed below.

Environmental Protection Agency www.epa.gov

Farm Service Agency www.fsa.usda.gov

Geological Survey www.usgs.gov

National Park Service www.nps.gov

Nature Conservancy www.nature.org

USDA Forest Service www.fs.fed.us

USDA Natural Resources Conservation Service (NRCS)
www.nrcs.usda.gov

U.S. Fish and Wildlife Service www.fws.gov

World Wildlife Fund www.wwf.org

References

http://www.thewaterpage.com/us_climate_change_report.htm

Climate Change and Biodiversity, Edited by Thomas E. Lovejoy and Lee Hannah, Yale University Press, 2005.

<http://www.climate-science.gov/Library/stratplan2003/final/ccspstratplan2003-chap4.htm>

<http://www.climate-science.gov/Library/stratplan2003/final/ccspstratplan2003-chap5.htm>

<http://www.climatescience.gov/Library/stratplan2003/final/ccspstratplan2003-chap6.htm>

http://www.gov.mb.ca/est/climatechange/pdfs/cc_primerdoc.pdf

http://www.climatechange.gc.ca/english/climate_change/

<http://www.climatechange.gc.ca/english/affect/pdf/manitoba.pdf>

http://www.climatechangeconnection.org/pages/subpages/effects_ccmb.html

http://www.adaptation.nrcan.gc.ca/posters/home-accueil_en.asp

http://www.ccme.ca/assets/pdf/cc_ind_full_doc_e.pdf

<http://www.lakewinnipegresearch.org/pdfs/LWRC2004.pdf>

http://www.gov.mb.ca/waterstewardship/cleanwater/clean_water_guide.pdf

http://www.ec.gc.ca/climate/overview_science-e.html

http://www.pacinst.org/reports/water_fact_sheet/

http://www.ucowr.siu.edu/updates/pdf/V112_A5.pdf

Arctic Climate Impact Assessment - Impacts of a Warming Arctic, 2004, published by Cambridge University Press -
<http://www.acia.uaf.edu/pages/overview.html>.

Climate Change Impacts and Adaptation: A Canadian Perspective -
<http://adaptation.nrcan.gc.ca/app/filerepository/F80B56D9915F465784EBC57907478C14.pdf>

<http://chemistry.beloit.edu/Warming/pages/begconkp.html>

http://www.grida.no/climate/ipcc_tar/wg2/159.htm

http://www.davidsuzuki.org/files/WWFglobal200_complete1.pdf

Climate Change Impacts and Adaptation: A Canadian Perspective
Water Resources
<http://adaptation.nrcan.gc.ca/app/filerepository/511B461E4DF64FCBA4C4ED6578050A74.pdf>

An Abrupt Climate Change Scenario and Its Implications for United States National Security, 2004
http://www.ems.org/climate/pentagon_climatechange.pdf

Union of Concerned Scientists Climate Change Information
http://www.ucsusa.org/global_environment/global_warming/page.cf?pageID=497 Arctic Climate Impacts Assessment, 2005
<http://amap.no/acia/> Key Finding 5 Coastal impacts Key Finding 6 Marine transportation Key Finding 7 Thawing ground

- relevant links and other useful info

<http://www.sciencedaily.com/directory/Science/Agriculture/Soils>
http://soils.usda.gov/sqi/soil_quality/soil_biology/index.html
<http://soils.usda.gov/sqi/>
<http://www.sarep.ucdavis.edu/soil/websites.htm>
<http://www.cwp.org> Center for watershed protection - lots of related info and links
<http://www.ctic.purdue.edu> Conservation technology and information center
<http://www.epa.gov/region6/water/npdes/sw/ms4/index.htm> (see "Storm Water Hot Topics")
<http://www.iwla.org> Isaac Walton League - great aquatics info
<http://www.nacdnet.org> National Association of Conservation Districts
<http://www.la.nrcs.usda.gov> USDA Natural Resources Conservation Service - soils and related educational info
<http://www.projectwet.org> Project WET (Water Education for Teachers) water ed info and links
<http://www.agry.purdue.edu/courses/agry255/brochure/brochure.html> soils info
http://www.swcs.org/f_orglinks_links.htm natural resource educational info
<http://www.usgs.gov/education> U.S. Geological Survey - Natural resource educational links and info
<http://www.usgs.gov/edu/> " " " water related info
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm Urban and residential stormwater management info
<http://www.cyber-sierra.com/area9/p-soils.html> Soils Info
<http://www.attra.org/soils.html> Soils info
<http://www.forestsoils.org/S-7/> Soils info
<http://www.des.ucdavis.edu/iad217/soilsites.html> Soils Info
<http://iaswww.com/ODP/Science/Agriculture/Soils> Soils Info
<http://www.jsasd.k12.pa.us/mhopple/nature/soils.htm> (past) Pennsylvania Envirothon